

REMARKS

The amendments are based on the specification page 10, lines 17 to 29 and drawing FIG. 2.

The un-needed analytical times have been deleted from claims 1, 28 and 31. In claims 28 and 29, "each" has been changed to -the- to accurately define the invention. New claims 44 and 45 further define a "high molecular weight fraction."

Claims 1, 4 to 8, 10 to 21, 23 to 29, 31, 34 to 36 and 38 to 45 are pending.

Claims 1, 4 to 8, 10 to 21, 23 to 29, 31, 34 to 36 and 38 to 43 were objected to for allegedly contradicting the specification disclosure. The claims have been amended in accordance with the "split" flow wording recommended in the Office Action. The amendments should overcome the objection.

The invention relates to a method for speedy determination of the molecular weight of a polymer reaction product of a diphenyl carbonate and a dihydric phenol. The specification points out that the reaction product of this reaction is a complex mixture of:

"reactants (e.g., monomers), catalysts, pH buffers, and non-polymeric products, in addition to oligomeric and polymeric products of polymerization. When the polymer comprises an aromatic polycarbonate, the reaction mixture may comprise, for example, the reactants diphenyl carbonate and bisphenol A, the product phenol, and a catalyst, in addition to polycarbonate oligomers and polymers.

Specification page 6, lines 5 to 11.

Additionally, the specification points out:

Alternatively, the molar mass determination may be conducted off-line after the concentration determination by diverting the high molecular weight fraction to a molar mass detector that has a cell capable of containing and effecting rapid mixing of the entire HMWF that is separable from the main flow of pumped solvent. The off-line embodiment permits more accurate determination of the average molecular weight and simplifies the calculation of average molecular weight. This is then equivalent to determination with zero dispersion or separation of the polymer but permits elimination of interfering low molecular weight substances. This configuration is shown in Figure 2.

Specification page 10, lines 22 to 29.

Claim 1 claims a method for determination of polymer molecular weight comprising a step of “determining off-line the molecular mass using the split flow path mass detector on a diverted high molecular weight fraction.” Claim 28 claims “diverting a portion of the analytical sample to the split flow path of the molar mass detector and disposing the remainder of each analytical sample to the waste reservoir; and determining the molar mass in the high molecular weight fraction of the diverted portion of the analytical sample using the molar mass detector.” Claim 31 claims a system for the determination of polymer average molecular weight comprising “a molar mass detector off-line from the sequence of chromatographic column, concentration detector and waste reservoir... for split flow path determining the molar mass in the high molecular weight fraction.”

Claims 1, 4 to 8, 10, 11, 18, 19, 21, 23, 24, 26 to 29, 31 and 34 to 36 were rejected under 35 U.S.C. §103(a) over Miroslav, Allcock and Connelly and claims 12 to 17, 20, 25 and 38 to 43 were rejected under 35 U.S.C. §103(a) over Miroslav, Allcock, Connelly and Nielsen et al. Reconsideration and withdrawal of the rejections are respectfully requested for the following reasons:

I. THE REFERENCES DO NOT TEACH OR SUGGEST “OFF-LINE” AS DEFINED BY THE AMENDED CLAIMS

The claimed sequence is (1) chromatographic column, (2) concentration detector and (3) waste reservoir with a split flow line from the concentration detector to a molar mass detector then to the waste reservoir. A high molecular weight fraction is diverted to the split flow line and molar mass of the high molecular weight fraction is determined by the split flow line molar mass detector. Miroslav, Allcock, Connelly et al. and Nielsen et al. do not teach or suggest the claimed “split flow” or “off-line” molar mass detection of the high molecular weight fraction.

In FIG. 5 (and column 8, line 36 to column 9, line 59), Connolly et al. shows an HPLC 502 (the chromatographic column (1)), a UV optical absorbance detector 516 (a qualitative detector) and an ELSD 512 (a quantitative detector). Splitter 504 splits a

stream from the UV optical absorbance detector 516 to a mass spectrometer 510. The Connelly et al. method and system “splits the chromatographic product “into two streams to facilitate simultaneously detecting ... constituent compounds in two different types of detectors. The information obtained from the two detectors is used to identify, quantitate and determine the purity of at least one compound of interest in the effluent.” Connelly et al., col. 2, lines 21 to 29. While Connelly et al. splits the chromatographic product into two streams for parallel analysis, the invention splits the chromatographic product into two streams, a particular one of which (the diverted high molecular weight fraction) goes to a dedicated and quarantined molar mass detector that permits accurate and simplified molecular weight determination (specification page 10, lines 22 to 29). Connelly et al. does not teach or suggest “determining off-line the molecular mass using the split flow path mass detector on a diverted high molecular weight fraction” (claims 1, 4 to 8, 10 to 21 and 23 to 27, emphasis added) or “diverting a portion of the analytical sample to the split flow path of the molar mass detector and disposing the remainder of each analytical sample to the waste reservoir; and determining the molar mass in the high molecular weight fraction of the diverted portion of the analytical sample using the molar mass detector” (claims 28 to 29 and 38 to 43, emphasis added) or “a molar mass detector off-line from the sequence of chromatographic column, concentration detector and waste reservoir... for split flow path determining the molar mass in the high molecular weight fraction” (claims 31 and 34 to 36, emphasis added) .

Connelly et al. FIG. 4 is only an iteration of an algorithm for processing data from a FIG. 3 device. FIG. 4 and col. 7, lines 50 to 65 are not relevant to the present invention. If the PTO disagrees, the PTO is respectfully requested to identify specifically the disclosure of FIG. 4 and col. 7, lines 50 to 65 that is purportedly relevant to the claimed sequence is (1) chromatographic column, (2) concentration detector and (3) waste reservoir with a split flow line from the concentration detector to a molar mass detector then to the waste reservoir.

The Office Action cites Drukier allegedly in support of “off-line” obviousness. But Drukier teaches a combined HPLC separation and detection off-line to a main effluent producing procedure. The Office Action states:

Drukier states that there are “three main modalities for analytical use of HPLC columns. The detection is done either inflight, or is done after the effluent is caught in a fraction collector”, further, at lines 36 to 38, Drukier supplies motivation for selection of either technique as an alternative, stating that the “relative merits of on-line and off-line monitoring of the chromatographic process may be evaluated in terms of cost and throughput”.

Office Action page 8.

But Drukier does not teach or suggest “determining off-line the molar mass using the split flow path molar mass detector on a diverted high molecular weight fraction” (claims 1, 4 to 8, 10 to 21 and 23 to 27) or “determining the molar mass in the high molecular weight fraction of the diverted portion of the analytical sample using the molar mass detector” (claims 28 to 29 and 38 to 43) or “a split flow sequence of concentration detector, molar mass detector and waste reservoir” (claims 31 and 34 to 36). Additionally, no need for evaluation in terms of cost and throughput is found in any of the references relied upon by the PTO. Indeed, this is a teaching away from combining with other references to provide the speed and accuracy of the invention.

Miroslav, Allcock, Connelly, Nielsen et al. and Drukier fail to establish a prima facie case of obviousness. “A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art....” *In re Rijckaert*, 28 USPQ2d 1955, 1956 (Fed. Cir. 1992). Miroslav, Allcock, Connelly et al., Nielsen et al. and Drukier do not teach or suggest “determining off-line the molar mass using the split flow path molar mass detector on a diverted high molecular weight fraction” (claims 1, 4 to 8, 10 to 21 and 23 to 27) or “determining the molar mass in the high molecular weight fraction of the diverted portion of the analytical sample using the molar mass detector” (claims 28 to 29 and 38 to 43) or “a split flow sequence of concentration detector, molar mass detector and waste reservoir” (claims 31 and 34 to 36).

“If examination... does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent.” *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). “When the reference(s) cited by the examiner fail to establish a prima facie case of obviousness, the rejection is improper and will be

overturned." *In re Deuel*, 34 USPQ2d 1210, 1214 (Fed. Cir. 1995). The references do not establish a prima facie of obviousness. The rejections of claims 1, 4 to 8, 10, 11, 18, 19, 21, 23, 24, 26 to 29, 31 and 34 to 36 under 35 U.S.C. §103(a) over Miroslav, Allcock and Connelly et al. and claims 12 to 17, 20, 25 and 38 to 43 under 35 U.S.C. §103(a) over Miroslav, Allcock, Connelly et al. and Nielsen et al. should be withdrawn.

II. ALLCOCK IS IMPROPERLY COMBINED

Miroslav and Nielsen et al. fail to teach or suggest a method for determination of polymer molecular weight of a "polymer reaction product of a diphenyl carbonate and a dihydric phenol." The Office Action states:

Allcock teaches that polycarbonates "of particular importance" are formed by reaction of bisphenol A (a dihydric phenol with the chemical formula of 2,2-bis(4-hydroxyphenyl propane) and diphenyl carbonate, (and inherently an appropriate solvent) see page 29.

Final Rejection pages 4 to 5..

The Final Rejection concludes:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a product of a polymer reaction between a diphenyl carbonate and a dihydric phenol as taught by Allcock in the invention of Miroslav as a sample for analysis in order to provide advantageous use of the invention of Miroslav, since Allcock teaches that such a product is "of particular importance". [sic] and Miroslav states that his invention is to be used with polymerization reaction product mixtures having commercial importance.

Final Rejection page 4.

This is an improper "conclusionary" statement unsupported by "the reasoned logic required by *In re Lee*, 61 USPQ 2d 1430, 1434, 277 F.3d 1338, 1343 (Fed. Cir. 2002). *In re Lee* holds that the PTO "must not only assure that... requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion [to combine references]." *In re Lee*, *supra* 61 USPQ 2d at 1434, 277 F.3d 1338 at 1343.

The chemical arts are unpredictable. As the court stated in *In re Marzocchi*, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971:

[I]n the field of chemistry generally, there may be times when the well-known unpredictability of chemical reactions will alone be enough to create a reasonable doubt as to the accuracy of a particular broad statement put forward as enabling support for a claim. This will especially be the case where the statement is, on its face, contrary to generally accepted scientific principles. Most often, additional factors, such as the teachings in pertinent references, will be available to substantiate any doubts that the asserted scope of objective enablement is in fact commensurate with the scope of protection sought and to support any demands based thereon for proof. [Footnote omitted.]

That Allcock discloses that diphenyl carbonate and dihydric phenol products are important is not a scientific basis that would have led one skilled in the unpredictable polymer art to conduct the Miroslav analytical process on a polymer revealed by Allcock.

An economic “commercially important” basis is not the reasoned logic required by *In re Lee*. A teaching of application to “polymer samples” is not a teaching to one skilled in the art of application to the particular chemical reaction product of a bisphenol and a diphenyl carbonate.

The only statement in the Office Action purporting to meet the PTO’s “logical and rational” obligation is the Allcock indication that polymer products of the reaction “bisphenol A (a dihydric phenol with the chemical formula of 2,2-bis(4-hydroxyphenyl propane) and diphenyl carbonate” are important. Why would one skilled in the art of polymer molecular weight determination be led to apply a diverted split path molar mass detection to unpredictable “bisphenol A (a dihydric phenol with the chemical formula of 2,2-bis(4-hydroxyphenyl propane) and diphenyl carbonate” polymers to provide improved non-dispersive determinations in view of a teaching that the polymers are important (Allcock). The Allcock indication that the polymer products are important is not the required *In re Lee* “logical and rational” reasoning.

To establish a prima facie case of obviousness based on a combination of references, the PTO must provide an:

...objective teaching... [that] would lead [one skilled in the art] to combine the relevant teachings of the references.” *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992)

... “When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001) (“the central question is whether there is reason to combine [the] references,” a question of fact drawing on the Graham factors).”

....

... The Board [PTO] must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.”); *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination “only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references”).

In re Lee, *supra* 277 F.3d at 1343 , 61 USPQ 2d at 1433-1434.

The PTO must provide “logical and rational” reasoning to support its determination (to reject on combined references). *In re Lee*, *supra* 277 F.3d at 1342, 61 USPQ 2d at 1432-1433. The PTO has not provided the “logical and rational” reasoning to combine references and the rejections must be withdrawn in accordance with applicable law.

Unless the PTO can meet the required *In re Lee* “logical and rational” reasoning to combine the Allcock “bisphenol A (a dihydric phenol with the chemical formula of 2,2-bis(4-hydroxyphenyl propane) and diphenyl carbonate” polymer teaching with the Miroslav molecular weight determination teaching and the Connelly split path teaching, the rejection must be withdrawn.

III. THE REFERENCES DONOT TEACH OR SUGGEST A MINIMALLY DISPERSIVE SEPARATION AS DEFINED BY APPLICANTS’ SPECIFICATION

Additionally, claim 1 claims “effecting a minimally dispersive separation... to yield a high molecular weight fraction” and claim 28 claims a step of effecting a minimally dispersive separation to yield a high molecular weight fraction “comprising polycarbonate oligomers and polymers comprising at least two bisphenol A units....” The specification page 8, lines 8 to 29 states:

A minimally dispersive separation is one that rapidly but substantially separates a high molecular weight fraction (HMWF) from a low molecular weight fraction (LMWF). The high molecular weight fraction is defined herein as comprising all oligomeric and polymeric products having at least two monomer units of at least one monomer. For example, the high molecular weight fraction of a sample comprising polycarbonate would comprise polycarbonate oligomers and polymers comprising at least two bisphenol A units.... In order to enable the fastest possible analysis time, it is preferred that the minimally dispersive separation create the least possible dispersion of the HMWF while maintaining its separation from the LMWF.

Miroslav, Allcock, Connelly et al., Nielsen et al. and Drukier et al. do not teach or suggest a “minimally dispersive separation... to yield a high molecular weight fraction... comprising polycarbonate oligomers and polymers comprising at least two bisphenol A units.”

The Office Action argues that the claimed “minimally dispersive separation” is taught at column 21, line 62 through column 22, line 2 (of Miroslav). This is incorrect. Miroslav process comprises “chromatographically resolving [the] polymer component(s) and monomer component(s).” A molecular weight determination is then made for each of the Miroslav separate components. The 1, 4 to 8, 10 to 21 and 23 to 27 and claims 28 to 29 and 38 to 45 claims are limited to a separation that yields “oligomers and polymers” (emphasis added). Particularly, the “minimally dispersive fraction” comprises polycarbonate oligomers and polymers comprising at least two bisphenol A units (claims 44 and 45) and even more particularly, the “minimally dispersive fraction” is defined by the particular baseline peaks and heights specified in claims 12 to 17 and 39 to 45. Otherwise, the separation is not “minimally dispersive.” A minimally dispersive separation that enables the “fastest possible analysis” would not have been obvious in view of the Miroslav and Allcock. references non-minimally dispersive separation that

does not provide the “fastest possible analysis.” The rejections of claims 1, 4 to 8, 10 to 21, 23 to 29 and 38 to 43 should be withdrawn.

The foregoing arguments are substantially the same as the arguments made in Applicant’s January 24, 2003 Amendment after Final Rejection under 37 C.F.R. §1.116. The PTO has not responded. Again, 37 CFR 1.104 entitled “Nature of examination,” states “(b) Completeness of examiner’s action. The examiner’s action will be complete as to all matters....” Further, MPEP 707.07, entitled “Completeness and Clarity of Examiner’s Action,” provides that “[t]he examiner must address all arguments which have not already been responded to in the statement of the rejection.” Further MPEP 707.07(f) entitled “Answer All Material Traversed” states “Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant’s argument and answer the substance of it.” Failure to respond to the Applicant’s “minimally dispersive” argument is improper examination.

IV. THE PTO SHOULD RESPOND TO APPLICANTS’ ARGUMENTS

The Manual of Patent Examining Procedure provides “Completeness and Clarity of Examiner’s Action,” “[t]he examiner must address all arguments which have not already been responded to in the statement of the rejection” (MPEP 707.07); “Answer All Material Traversed” “Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant’s argument and answer the substance of it” (MPEP 707.07(f)); and “Amendments After Final Rejection or Action, Procedure Followed” “Advisory Action form PTOL-303 should be used to acknowledge receipt of a reply from applicant after final rejection where such reply is prior to filing of an appeal brief and does not place the application in condition for allowance. This form has been devised to advise applicant of the disposition of the proposed amendments to the claims and of the effect of any argument or affidavit not placing the application in condition for allowance or which could not be made allowable by a telephone call to clear up minor matters” (MPEP 714.13, emphasis added). The Advisory Action failed to respond to Applicants’ arguments (1) and (2). The PTO is respectfully requested to allow the claims or to address Applicants’ arguments (1) and (2) and the “non-predictability of chemical reactions” argument and the “minimally

dispersive separation“ argument of this Amendment and the January 24, 2003 Amendment after Final Rejection under 37 C.F.R. §1.116 and of

Additionally, the PTO has failed to properly make provisional application 60080652 and Petro 6,260,407 of record. Applicants have argued that so long as these references are not of record, the PTO has failed to overcome Applicants' Declaration establishing invention prior to the effective date of the Miroslav reference. The PTO has not addressed this issue. Provisional application 60080652 and Petro 6,260,407 are not of record and all rejections should be withdrawn as overcome by Applicants' Declaration.

V. CONCLUSION

In view of the foregoing remarks, reconsideration and allowance of claims 1, 4 to 8, 10 to 21, 23 to 29, 31, 34 to 36 and 38 to 45 are respectfully requested.

Should the Examiner believe that any further action is necessary in order to place this application in condition for allowance, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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JUNE 16, 2003